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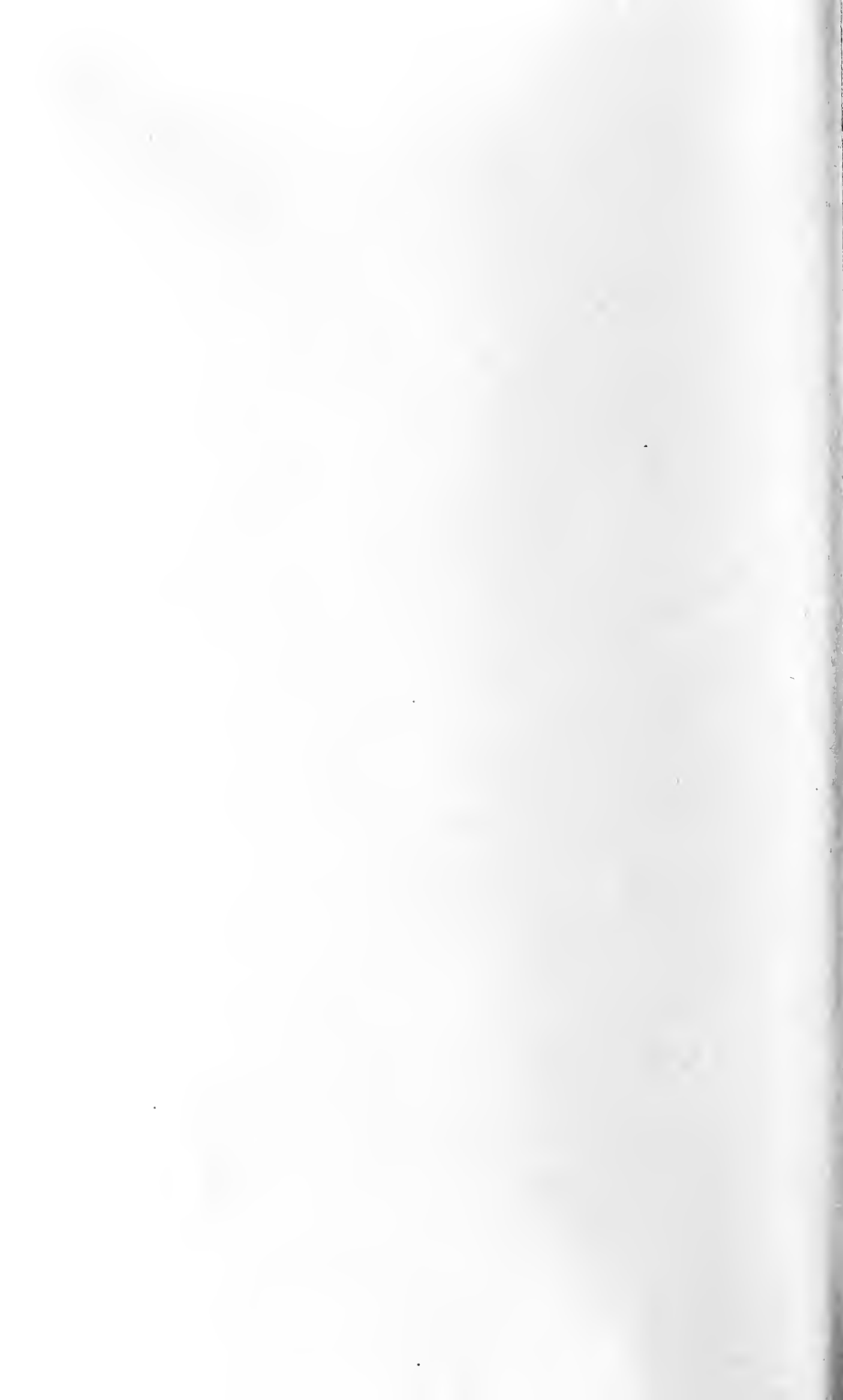


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Agricultural Experiment Station

College of Agriculture, West Virginia University

HENRY G. KNIGHT, Director
Morgantown

Agricultural Experiment Station Work

(Plans of Work—Revised 1926)



By
HENRY G. KNIGHT

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HENRY G. KNIGHT, Ph. D.....	Dean of the College of Agriculture and Director of the Experiment Station
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Agricultural Experiment Station Work

(Plans of Work—Revised 1926)

The Experiment Station Program

In the fall of 1922 the staff of the West Virginia Agricultural Experiment Station began an intensive study of the agriculture of the state in the hope that the information obtained would be of value in planning the experimental work of the Station along more practical, needful, and efficient lines. This study, a summary of which is given in another portion of this publication, included a statistical analysis of the development of the several phases of agriculture during the past decade or more, the apparent trend at present, and the probable development in the future. The members of the Experiment Station staff further indicated, from their study of the facts and figures collected, the lines of research and experimental work which in their judgment might prove to be of most value. Beyond this point the staff did not desire to accept further responsibility. As the Experiment Station has for its object the carrying on of experimental work in agriculture, it seems logical that those who are engaged in agricultural pursuits should also indicate such experimental work as in their judgment seems needful.

The matter was discussed at the meetings of the State Horticultural Society in February, 1923, and the State Farm Bureau Federation in January, 1924, and the Director of the Experiment Station proceeded to invite the several state agricultural organizations to participate in the work of formulating plans for the future development of experimental work at the Agricultural Experiment Station. Committees were, therefore, appointed from the West Virginia Farm Bureau Federation, the West Virginia Farm Women's Clubs, the West Virginia Poultry Association, the West Virginia Horticultural Society, the West Virginia Livestock Association, the West Virginia Bee Keeper's Association, and the West Virginia Dairymen's Association.

These committees met with the representatives of the Agricultural Experiment Station and the Extension Division at Morgantown on August 11, and at Jackson's Mill on August 12 and 13, 1924. The results of these conferences were embodied in a set of Tentative Plans and published as Bulletin No. 193 of the West Virginia Agricultural Experiment Station.

Since modern Agriculture is dynamic, it was the intention that these plans be changed from time to time to meet the needs of changing conditions and changing interests, but the possibility of opening new lines of work and enlarging the field of usefulness of the Agriculture Experiment Station came somewhat more quickly than was expected through national legislation.

On February 24, 1925, the President of the United States signed an act known as the Purnell Act, passed by the sixty-eighth Congress. Under the terms of this act Congress is authorized to appropriate the "sum of \$20,000 for the fiscal year ending June 30, 1926; \$30,000 for the fiscal year ending June 30, 1927; \$40,000 for the fiscal year ending June 30, 1928; \$50,000 for the fiscal year ending June 30, 1929; \$60,000 for the fiscal year ending June 30, 1930, and \$60,000 for each fiscal year thereafter to be paid to each State and Territory." The funds appropriated under the act are to be applied "to paying the necessary expenses of conducting investigations or making experiments bearing directly upon the production, manufacture, preparation, use, distribution, and marketing agricultural products and including such scientific researches as have for their purpose the establishment and maintenance of a permanent and efficient agricultural industry and such economic and sociological investigations as have for their purpose the development and improvement of the rural home and rural life." This act opens up to the Experiment Station for experimentation and investigation the fields of Home Economics and Rural Sociology. For this reason it became important that plans be made which would adequately cover such portions of these fields as seemed of special interest to the state of West Virginia.

In the fall of 1925 a call was sent by the Director of the Experiment Station to the officers of the several state agricultural organizations for a meeting of their research committees to meet at Morgantown January 13, 1926, for the purpose of making revisions and additions to the plans of work of the Experiment Station.

The committees appointed met with the director and the staff of the Agricultural Experiment Station and the revised plans as developed and approved by these committees may be found in the concluding section of this bulletin. The committees were as follows:

West Virginia Farm Bureau—

*J. B. McLaughlin, Charleston, W. Va.

C. C. Lewis, Point Pleasant, W. Va.

*Ross Tuckwiller, Lewisburg, W. Va.

West Virginia Farm Women's Bureau—

- *Mrs. Fenton Gall, Martinsburg, W. Va.
- *Mrs. Bessie Bright, Flatwoods, W. Va.
- *Mrs. Gilbert Scott, Elkins, W. Va.

West Virginia Horticultural Society—

- E. A. Leatherman, Rada, W. Va.
- *H. W. Prettyman, Inwood, W. Va.
- *M. W. Fulton, Sleepy Creek, W. Va.
- H. Lott Smith, Martinsburg, W. Va.

West Virginia Livestock Association—

- *W. J. Strader, Beverly, W. Va.
- *J. C. Gibson, Kingwood, W. Va.
- *B. F. Creech, Morgantown, W. Va.
- *J. B. Huyett, Charleston, W. Va.

West Virginia Dairymen's Association—

- W. G. Riggs, Moundsville, W. Va.
- *Amos Tebay, Parkersburg, W. Va.
- *D. W. Coffield, West Alexander, Pa.

West Virginia Poultry Association—

- *Oscar Goetgeluck, St. Marys, W. Va.
- *Earl McGlothlin, Ravenswood, W. Va.
- *E. H. Humphrey, Belleville, W. Va.

Bee Keeper's Association—

- *W. E. Massey, Charleston, W. Va.
- *L. M. Pairs, Morgantown, W. Va.

Poultry Producers Association—

- T. J. Winegrove, French creek, W. Va.
- *C. B. Wilson, Frenchton, W. Va.
- Mrs. Jennie Houghton, Frenchton, W. Va.
- Byan Foster, Buckhannon, W. Va.
- *C. C. Blake, Buckhannon, W. Va.

A BRIEF REVIEW OF THE AGRICULTURE OF WEST VIRGINIA

Rural Economics and Sociology

AGRICULTURAL ECONOMICS

According to the 1925 farm census of the United States, there were more than 90,000 farms in West Virginia. During the five years 1920 to 1925 the number of farms increased more than 3,000 or nearly 3.5 per cent, while the farm area of the state decreased more than 500,000 acres. In the five years the average farm decreased 10.2 acres. The passing of the small general farm, which was generally unprofitable, but a few years ago caused a tendency toward increasing the average size of the farms, but more recently the establishment of small truck and poultry farms has increased the number of small farms in the state. In the decade preceding 1920 the value of farm property increased 57.7 per cent, but since 1920 farm values have declined about 13 per cent.

Under normal conditions every farm has its individual problems of organization of the various factors of the farm business, of the adaptation of farm practice to the peculiar environment, and of the disposition of farm products in such a way as to secure the highest continuous profit; but with the rapidly changing economic conditions of the past fifteen years aggravated by the results of the war, the conditions have been very unsettled.

It has not been many years since the farmer was interested primarily in production for home consumption only. With the rise of industry in America his interests have broadened somewhat, but back of it are the same motives as formerly. He has not organized his thoughts or his farm with the market in view. He simply has grown more wheat, more potatoes, more corn, and more livestock and has sold the surplus. Now he is giving thought and attention to markets and marketing and all that goes with his widened field of thought and vision. Where formerly he was primarily interested in problems of production today he finds that these are only a few of his many interests.

Relatively few farmers have kept pace with the changing character of demands. Their attention has been concentrated primarily upon the solution of problems of production while other matters have been left largely to other agencies which in many instances were not able to give satisfactory service. Too often such agencies were fostered by private interests with selfish motives.

Farming, the same as any other business, must be organized for the purpose of giving returns upon capital and labor; therefore, production must be primarily for the purpose of securing an economic

profit. The introduction of any crop, the expansion or contraction of acreage, the place of livestock on the program, the use of fertilizers, and similar questions should be prefaced with the question, "Will it pay?" or "Can it be made to pay?" This thought should be the basis of the farmer's economic questions.

In the last analysis, a prominent place should be given to the consideration of the farm as a place to live—that is as the home of the family; hence the interest must be wider than the farm itself. The community in which the farm is located means much in making the farm a satisfactory home. Investments in proper community undertakings such as roads, schools, churches, and recreation give large returns in satisfaction and contentment, which are reflected back to the individual farms.

The increased use of farm machinery, labor-saving devices and conveniences for the home, better methods of transportation, disease control, modern means of communication, the rapid spread of news, the shifting of the population from rural to urban centers, the trend toward co-operative undertakings upon a scale hitherto unheard of, the changing community lines and interests, the advent of hard-surfaced roads, the demands for better educational advantages, the changing attitude toward the church, and many other things tend to give economic and sociological problems the first place in the minds of the rural thinking public. Any production program for the individual farm, community, or state should have a sound fundamental economic basis if it is to be a success. Furthermore, the social aspect must not be overlooked. It seems logical therefore that the West Virginia Agricultural Experiment Station should give careful consideration to the general subject of agricultural economics in its program.

RURAL SOCIAL CONDITIONS

Rural social investigation and study has for its aim the development of conditions which are conducive to a more satisfying rural life, so that a wholesome balance between rural and urban population may be maintained. The problem of making a living, while important in itself, must not so absorb the minds and energies of the rural people as to exclude cultural, aesthetic, recreational and social activities, the protection of health, and the development of group consciousness.

The home is not only a place in which to live; it is also the center of the business and social life of the farm family. As a place in which to live, many rural homes in West Virginia might be greatly improved.

In many cases economic conditions on farms in the state would permit the addition of more conveniences, such as running water, electric lights, and labor saving devices in the homes. More research work is needed as a basis on which to advise and encourage individual farmers in installing such conveniences as their economic conditions will permit.

Reports of the waning influence of the rural church are current. Studies of the place of the church in rural life are needed with a view to discovering adjustments which may guide the church into its most effective function in community life.

The enrollment in educational institutions in the rural districts has had a steady growth. The length of the school term has been greatly increased within the past few years as a result of the keen interest in rural education.

There are nine full-time county health units within the state at present. The interest in this type of service has spread rapidly, bringing to light ways of rendering more efficient health service. Facilities for bringing health education to backward communities are at present very inadequate.

Rural recreation is being fostered through clubs and community groups. This recreational program may be furthered by giving information on what to do and how to do it.

The Country Life Program in West Virginia has developed very largely on the community basis. The rural people must be taught to study their own rural problems and formulate methods of improvement.

The Livestock Industry

ANIMAL HUSBANDRY

The livestock industry is one of the most important agricultural industries in West Virginia and one in which there is opportunity for an increase in quality and standardization. A major portion of the state is favorable to the development of livestock and as the state is well adapted to grass, livestock production should be possible at a minimum cost.

Horses and Mules

A study of the situation with respect to the horse and mule industry would indicate that there will probably be little change in the numbers produced in West Virginia for some years to come. The industry is apparently becoming fairly well stabilized upon the basis of importation of about ten thousand horses and mules annually. Better meth-

ods of feeding and handling and the introduction of better sires may tend to decrease the importation somewhat; this may be counterbalanced, however, by the growing demands for horses in some of the industries other than agriculture. The mule industry cannot be considered as affecting the industry as a whole, for an increase in mule production will probably tend to decrease in like proportion the production of horses.

At present little experimental work is being done with horses and mules; an effort is being made, however, to get a few leading communities interested in one draft breed and when a stallion is placed the same breed will be used.

Beef Cattle

West Virginia is producing more than half of the quantity of beef that is consumed in the state. During the past ten years there has been a slight increase, not only in the number, but also in the quality of beef cattle, and the interest that is shown would indicate that there will be little change in numbers and a marked increase in the quality of the cattle sent to market. There is a stronger tendency than formerly for livestock breeders to use purebred sires. Further, the purebred sire law which went into effect January 1, 1923, is having considerable influence in increasing the number of high class cattle. Owing to the importance of the beef cattle industry and its probable development, considerable thought and attention should be given to increasing the efficiency of the industry.

Sheep

The number of sheep in West Virginia has fluctuated considerably during the past decade. At present there are fewer sheep in the state than there were ten years ago, but the number is now increasing, due probably to the relatively high price of wool and mutton. Much of the land in the state is better suited for grazing sheep than for any other purpose, and since sheep raising is one of the most profitable branches of the livestock industry the outlook for further expansion is encouraging. The success of the sheep industry is, however, largely dependent upon better shepherding, control of parasites, control of dogs, and cooperative marketing.

Swine

From the best information obtainable it seems that West Virginia is producing approximately one-half the pork and pork products consumed within the state. There has been an increase in the number of swine produced but this has not kept pace with the increase in consumption.

DAIRY HUSBANDRY

There has been an increase in the number of dairy cattle in the state during the past decade and the trend has been toward the use of better grades of livestock. Such trend is indicated by the increasing number of purebred sires of the dairy breeds which have been put into service. There is a decided increase in the market milk phase of the industry which will probably be more pronounced during the next decade with the development of good roads and larger cities. The per capita consumption of milk in West Virginia is far below what it should be.

The yearly consumption of butter in the state exceeds the production by more than five million pounds. Much of the butter produced by farmers is of poor quality and is expected, while butter from the dairy centers of the United States is imported. It seems therefore that there is room for considerable improvement in dairying, especially cream and butter production in sections somewhat remote from a market for milk.

The production of cheese is relatively negligible and considering the comparative values of milk and cheese locally it seems that we cannot afford an increase in the production of the latter in the immediate future.

The production of cream for sale is one branch of the dairy industry that probably offers promise of greater growth than any other.

POULTRY HUSBANDRY

Poultry production in West Virginia has increased more than 25 per cent in the last ten years. Ours being primarily an industrial rather than an agricultural state, the demand for poultry products, is likely to be good for a long time to come. At present our production does not begin to supply the home demand and consequently large importations, especially eggs and baby chicks, come in from neighboring states; there should be no fear, however, of such competition, with our market at our door we can more readily supply a superior product, especially in eggs, and so hold our own.

It is probable that the development of the poultry industry for commercial purposes for some time will be along the line of egg production as dressed fowls can be produced more economically in the corn belt of the United States.

Plant Industry

Plant industry includes the growing of economic crops whether for the maintainance of livestock or for the consumption of man. Forest, field, orchard, and garden all contribute their share to the welfare and happiness of mankind. The erection of homes, the manufacture of clothing, the beautification of the landscape, the preparation of medicines, are among the things which one might enumerate as human activities which are greatly dependent on plants—in fact all animal life including man, directly or indirectly obtains its sustenance from the plant world. It at once becomes apparent why plant industry is of great importance and should be given consideration accordingly.

AGRONOMY

Agronomy has to do with the growing of grains and forage crops. The successful production of livestock is dependent upon a cheap supply of high quality feed and therefore it naturally follows that many of the problems of crop production are also problems of livestock production.

Field Crops

The greater portion of the field crops grown in West Virginia is consumed by livestock, and hence is basic to the livestock industry. The further development of the livestock industry of the state depends largely on an increase in the production of corn, and leguminous hay through greater yield per acre, and the improvement of pastures. The field crops which are of most importance to the livestock industry are corn, oats, and buckwheat, while those for direct human consumption are wheat, buckwheat, and tobacco.

There is a need for some experimental work with the rotation of crops commonly grown in West Virginia. There has been considerable discussion among farmers as to the proper place of soybeans in a rotation and it is apparent that a difference of opinion exists. The experience of some indicates that soybeans have an injurious effect on certain crops that follow whereas the experience of others does not. Some experimental work to ascertain the facts has been started and more will probably be started in the immediate future.

Forage Crops and Pastures

During the past ten years, there has been a decided tendency to decrease the acreage of timothy meadows, while there has been an increase in the meadows containing both timothy and clover. The clover acreage has more than doubled, and soybeans, a relatively new crop, has increased by leaps and bounds in West Virginia. It is becoming the common practice to grow annual legumes for hay in-

stead of the small grains and annual grasses. Corn cut for fodder is not markedly on the increase but a larger tonage of crops, are going into the silo each year. This indicates that stockmen are giving more attention to winter feeding.

One of the limiting factors in the more extensive production of red clover and alfalfa is the matter of unadapted seed. Each year great quantities of these seeds are imported into this country and sold to farmers. Some of this seed is not adapted and consequently the crop is partially or completely lost. More experimental work is needed to determine the adaptation of these seeds for West Virginia conditions.

Approximately 60 per cent of the total acreage of improved land in West Virginia is in pastures. This area seems to be almost stationary and there is little to indicate that there will be a change in the near future.

The problem, therefore, is to make our pasture land more productive. Some experimental work underway indicates that the carrying capacity of much of our present pasture may be doubled easily by the proper use of lime and of acid phosphate.

HORTICULTURE

The field of horticulture is a large one including pomology (fruit growing), olericulture (vegetable growing), floriculture (flower growing), and landscape gardening (use of trees, shrubs, and flowers in home and community beautification). Interest in the state so far has centered chiefly in the fruit and vegetable growing.

Fruit Crops

Fruit growing is one of the most important industries in West Virginia. Of the tree fruits only the apple and peach have been planted to the extent that they may be regarded as distinct industries. There has been a marked increase in the number of apple trees in bearing over that of a decade ago, but new plantings have fallen off in numbers. Even if the industry remains stationary it has already assumed considerable proportions and should continue to receive attention. The number of bearing peach trees has decreased in the last ten years as well as has the number of new plantings. There are indications, however, of a revival of interest in peach growing.

One may look for the development of the small fruit industry to supply local markets and as an adjunct to the tree fruit and trucking industry as canneries and by-products plants become established. With the growth of industrial centers these crops will be grown more

extensively for commercial purposes especially in view of the fact that only a small part of the total quantity of these crops consumed in the state is produced locally.

Truck Crops

The commercial production of vegetable crops either under glass or out-of-doors is not of great importance at present in the state's agriculture, however, marked increase in interest is being shown.

That home grown products when properly grown and presented demand a premium and that the demand is greatly in excess of the supply of the products is known. It is fast becoming apparent that this phase of agriculture has promise, since it is recognized that: (a) The climate is favorable for this type of agriculture, in that the growing season is long and the storage period (winter) is short and relatively mild. (b) There are many soils in nearly all sections of the state which can be fitted without undue effort or expense for this type of production. (c) The wide diversity of growing conditions peculiar to this state afford the possibilities for the successful culture of a wide variety of vegetable crops. (d) Many persons who have previously been engaged in general farming are profitably producing vegetables without having had any special training.

FORESTRY

But little general interest seems to be taken in forestry in West Virginia. There are now considerable stands of good second-growth timber. The virgin timber has now practically disappeared. The logged off land in some cases is being converted into pastures, but the greater portion is receiving no attention whatever. Little consideration has been given to systematic reforestation, although other states apparently have found that it returned considerable profit. It seems that some existing agency or one organized for the purpose would find a fertile field in developing public interest in forestry. A tree nursery established by the state would help much in developing interest and would pave the way for experimental work.

Plant Diseases and Pests

The losses from plant diseases and plant pests vary widely from year to year, which loss may be explained by the variation in the annual production and by the activity of certain diseases and pests. Every year, however, the losses reach enormous proportions. For the crop season of 1924 the losses from plant diseases alone have been estimated for West Virginia by the Plant Disease Survey of the United States Department of Agriculture as follows:

Corn.....	790,000 bushels
Wheat.....	105,000 bushels
Oats.....	145,000 bushels
Potatoes.....	3,227,000 bushels
Tomatoes.....	12 per cent of crop
Apples.....	1,750,000 bushels
Peaches.....	81,000 bushels

Much of these losses is preventable by the application of control measures already known. It is certain that, with the increase in population, our agriculture will of necessity become more intensive and more attention will therefore be given to production of maximum crops upon minimum acres. The total land and fertilizer used may remain the same, yet the crops harvested may be greatly and profitably increased in most cases by a better knowledge of plants diseases and plant pests together with practical methods for their control.

Since heavy importations of food products annually come into the state, we may expect, with the more commonly known diseases and pests, outbreaks of others whose origin may be difficult to trace. Just recently the potato wart disease has been introduced into Pennsylvania, Maryland, and West Virginia. This is an European disease. It is impossible to foretell how such diseases or plant pests may act under environmental conditions of any new locality, but they do in many places prove very destructive. We should therefore, have information concerning the various diseases and plant pests prevalent in all sections of the state.

It is acknowledged by many who are familiar with the horticulture conditions of West Virginia that plant diseases are the most important limiting factor of production at the present time. Frost and drought cause occasional injury, but the plant disease problems are always with us and most if not all of them may be solved by careful and persistent study.

Soils

A detailed study of almost five hundred samples of soils, collected from various sections of the state, has shown that the productivity of the land under cultivation in West Virginia could be greatly increased by improvements in soil management.

FERTILIZATION

One-half of the soils in the state are deficient in the supply of phosphorus. Practically all types of West Virginia soils respond to treatments of acid phosphate.

Two-thirds of the soils are deficient in nitrogen. There should be greater conservation of the manure and a more extensive growing of legumes. Thus the amount of organic matter which is too low in practically all soils may be increased. Experiments on DeKalb soil show greatest returns from manure and lime. While the increased expenditures for fertilizers in recent years have resulted in a slight increase in productivity, yet there is evidence that a more intelligent expenditure could be made. Selections of the proper formulae for the particular needs and of high-grade, high-analysis materials would net larger returns.

LIMING

Nine-tenths of the soils have shown a need for lime. During the excursions of the various lime trains that have been run over the state, thousands of soil samples have been tested for lime requirements. These tests, as well as those made in the laboratory, all point to a need for lime.

Agricultural Engineering

The rapid advancement in agriculture has been largely due to the change from hand to machine methods. The development and use of mechanical power and field machinery have been very rapid. Little experimental work has yet been done, however, regarding the types and sizes of machines best suited to given conditions, the cost of machine equipment, and the size of business which warrants investments in specific machines. Due to the topography of the state, there is considerable opportunity for the development of water power from small streams. This is a source of farm power as yet almost untouched.

Farmers in West Virginia have yet made but little progress in matters of sanitation on the farm. A pure water supply and safe sewage disposal are essential to good health. Farm buildings have been given very little consideration. Farmers are erecting buildings with no definite plans and with no thought of future developments. Much waste in both time and money results. Plans and information relative to farm buildings and sanitation are needed.

Home Economics

The population of West Virginia, according to the 1920 census, was 1,463,701. There are in West Virginia about 90,000 farms. It is estimated that there are about 293,000 homes in West Virginia with approximately 195,000 children under five years of age whose care is

the responsibility of the home maker. This ranks home-making in West Virginia as one of the most important occupations.

Home Economics is a comparatively new subject in the curriculum of the public schools, colleges, and West Virginia University, having been introduced within the past fifteen years. It is not possible to show the trend of Home Economics as of Agriculture not only because of its newness but because it is concerned with human relationships as well as conservation of materials used in the management and maintenance of the home. Its values are intangible, hence, it cannot be measured in terms of money as can Agriculture. It can be stated, however, that there is a constantly growing realization of the necessity of having training for the job of home manager. This trend has emphasized the need of a knowledge of facts in regard to the current practices in West Virginia homes.

We do not know what the food habits are in the homes of the state. Gillette states that of 2,181 apparently healthy children examined at the Health Clinic in New York, 30 per cent were diagnosed as mal-nourished. We have no reason to assume, without facts, that conditions here in West Virginia are any better. We also need to know the food consumption in the standards for good nutrition.

We do not know the amount of money which is spent for clothing in the homes in West Virginia. We do not know what the relation of the clothing expenditure is to the family income. We do not know what types of clothing are made in the homes and what types are bought ready made. We do not know what kind of labor saving equipment is used in the homes of the different communities in the state. We do not know what cooking processes are carried on in the homes or how much food is canned in the homes.

A beginning of the study of fact-basis, instead of opinion in Home Economics has been made in the department of Farm Economics in its standards-of-living studies. We need to take these studies and analyze them from the point of view of the needs of the home maker.

The first research project in Foods was begun in the fall of 1925 in a study of the utilization of surplus fruits which would otherwise go to waste in the farm home.

This need for a fact-basis on which to build intelligent home keeping is felt so keenly by the farm women that at the meeting of the West Virginia Farm Women's Bureau in January, 1926, at Morgantown recommendations for research problems were made to the Experiment Station as a basis for its five-year program, which is given in the concluding section of this bulletin.

OUTLINE OF PLANS FOR THE DEVELOPMENT OF EXPERIMENTAL WORK AT THE WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION, AS APPROVED BY THE COMMITTEES FROM THE SEVERAL STATE AGRICULTURAL ORGANIZATIONS, MEETING AT MORGANTOWN, JANUARY 13--15, 1926.

I. AGRICULTURAL ECONOMICS AND SOCIOLOGY

Lines of Investigation Proposed	Experiments in Progress, Discussions, and Committee Recommendations
1.—Farm Organizations	
(a) Field and Building Arrangements	The most satisfactory field and building arrangements to meet various requirements and types of farming should be studied. No recommendations made.
(b) Distribution of Farm Power and Labor for Various Enterprises	Crops and livestock enterprises compete with each other for labor and farm power. The best distribution of labor and power on the most remunerative farm enterprises should be studied. Not approved for immediate investigation.
(c) Types of Farming to Fit a Locality	There is apparent need for larger incomes for farmers. Their present incomes can be supplemented by means of additional cash crops and livestock products. Just what cash crops and livestock products can be made a part of the farm organization economically should be ascertained for several regions of the state. Approved for immediate consideration.
(d) Distribution and Use of Capital	How capital is distributed and used is shown in Bulletin 187, "Organization and Management of Typical West Virginia Farms." Not approved for further investigation.

2.—Cost of Production of Farm Products

(a) Livestock

There is very little information available on the cost of production of livestock in West Virginia. This information is desirable and data should be obtained as rapidly as possible. Recommended for investigation.

(b) Forage and Field Crops

Project No. 111 C, "Farm Cost Accounts," has been started. Bulletins 163 and 187 contain some information on cost of producing the principal field crops. Approved for further investigation.

(c) Fruit Crops

Information is needed upon cost of production of the principal fruit crops. It is recommended that investigations be made in cost accounting of production and marketing operations in apples in the principal apple centers of the state. Project No. 146 C covers this subject. Approved for investigation.

(d) Truck Crops

The increasing interest in commercial truck crops as a business indicates that information upon costs of production is desirable. No recommendations made.

3.—Marketing Farm Products

(a) Systems of Distributing

Project No. 126 C covers marketing of livestock. Data on methods and costs of marketing livestock in 1922 were collected but not published. Additional study of co-operative marketing is desirable before publication. Approved for further investigation.

(b) Local and Distant Markets

Project No. 127 C covers local marketing. Investigations have been made in and around Charleston and Clarksburg. This will be extended to other West Virginia cities as rapidly as funds are available. Knowledge of the amounts of farm products used by the different cities at different seasons of the year and where such products are grown, should be valuable. Approved for further investigation.

(c) Commercial Grades and Packages

Project No. 127 C covers this subject. Data have been collected to show the commercial grades and types of packages that are in demand at Charleston. The work will be extended to other cities as funds will permit. Approved for further investigation.

(d) Market Demands

Project No. 127 C covers this subject. Data have been collected at Charleston and Clarksburg which show the market demands. Surveys will be made in other cities as rapidly as funds will permit. Approved for further investigation.

(e) Costs of Marketing

Project No. 127 C covers this subject. Data have been collected at Charleston, which show some data on the cost of marketing the various kinds of farm products. Approved for further investigation.

(f) Warehousing

Information has been collected concerning organization, financing, and management of warehouses and is approved for further investigation. Project No. 144 P covers this subject.

(g) Packing Plants, Creameries, etc.

Information concerning organization, financing, and management of packing plants, creameries, etc., would be desirable. Recommended for investigation.

4.—Rural Financing

(a) Systems of Farm Credit and Uses of Different Types of Credit

- (1) Federal Farm Loan
- (2) Joint Stock Land Banks
- (3) Federal Intermediate Credit Banks
- (4) Personal Credit

(b) Business Methods

Use of capital, use of credit, and expenditures are problems for consideration. Not approved for investigation.

(c) Financing of Political
Units

The part farm lands and farm property should assume in financing political units is not clear. Cooperative studies of this problem are needed.
No recommendations made.

5.—Rural Social Studies

- (a) The Family
- (b) Group Activities
- (c) The Community
 - (1) The Trade Community
 - (2) The Social Community
 - (3) The Church Community.
 - (4) Community Life

It is recommended that the field of community life be opened up. A survey of the field should be made as a beginning of the work.

II. LIVESTOCK INDUSTRY**Lines of Investigation
Proposed****Experiments in Progress, Discussions,
and Committee Recommendations****1.—Horses**

- (a) Breeding Experiments
- (b) Feeding and Nutrition Experiments
- (c) Diseases and Parasites

No recommendations were made concerning experiments with horses.

No recommendations were made concerning experiments with horses.

No recommendations were made concerning experiments with horses.

2.—Beef Cattle

- (a) Breeding Experiments
- (b) Feeding and Nutrition Experiments

The committee recommends that demonstrations and experiments be made to show the comparative values of pure-bred and scrub sires.

Project No. 100 C, now in progress, has for its object to determine the comparative value of scrub and pure-bred steers under similar conditions. Project No. 117 C, carried on at Lewisburg in cooperation with the United States Department of Agriculture, has for its object to determine the effects of certain different winter rations fed to calves upon the steers ultimately produced.

Project 130 C, now in progress, has for its object to determine the most economical age to market steers in West Virginia.

Project No. 137 P has for its object a study of high grade and low grade steers from the standpoint of the quality and percentage of the various carcass cuts, also the effect of grain feeding on grass upon the quality of the carcass. This project is a cooperative one between the Station and the United States Department of Agriculture. It is located on the Tuckwiller farm at Lewisburg.

It is urged that the study of the comparative value of scrubs and high grade steers be continued. That it be determined whether it is profitable to feed a little grain or concentrates to steers when first turned on grass. That it be determined whether it is profitable to feed grain to steers on grass a few weeks before shipping to market. That it be determined whether it is profitable to grain yearlings and two-year-old steers for 60 to 90 days after they have made their grass finish. That the relative merits of allowing two-year-old steers to run on pasture as against stabling during the winter feeding period be determined.

(c) Diseases and Parasites

It is recommended that tests be made with various dips at the animal husbandry farm for the eradication of external parasites and skin diseases.

3.—Swine

(a) Breeding Experiments

No recommendations were made.

(b) Feeding and Nutrition Experiments

Some experimental work is now in progress. Project No. 49 C has the object of determining the value of various forage crops and a comparison of various feeds when fed to growing hogs in dry lots. Project 125 C, entitled, "Growth Studies With Young Pigs," has for its object to determine

the comparative values of different types of protein feed in promoting thrift and growth in young pigs. Certain mineral mixtures and yeast fermented materials are also used.

Project No. 121 C, entitled "Growth Studies With Swine," has for its object to determine the effects of feeding butter-fat and oleomargine fats and oils with a basal ration free from known sources of vitamin A upon the growth and development of swine. It is recommended that a study be made of the quality of pork produced by full feeding as against light feeding on forage crops. This study has been made strictly from the standpoint of the farm meat supply. It is also recommended that a ham and bacon show be put on during Farmers' Week and if possible some of the products produced by the different methods of feeding as recommended be displayed.

(c) Diseases and Parasites

No recommendations made.

(d) Management

It is recommended that definite information be obtained for handling and curing pork on the farm and that the requirements for producing a standard sausage carrying uniform flavor and color, practical for the small producer of hogs, be determined.

4.—Sheep

(a) Breeding Experiments

Project No. 129 C is being carried out on the farm of H. W. Beard, Pocahontas County, and has for its object a study of the most profitable breeds of mutton rams for use on native ewes for the production of market lambs.

(b) Feeding and Nutrition Experiments

A study should be made on the wintering of breeding ewes from the standpoint of economy.

Experiments should be conducted upon the feeding of thin late lambs.

- (c) Diseases and Parasites Study should be given to parasites and methods of control. A project (No. 99 C) has been outlined upon this subject, but no work has been started.
- (d) Management A field study of the utilization of cut over lands for sheep production is urged.
- (e) Wool A study of fleece changes from year to year should be made. A study of wool improvement from standpoint of fineness and length of fibre should be taken up.

5.—Dairy Cattle

- (a) Breeding Experiments Project No. 113 C, entitled "Line Breeding vs. Outcrossing," with the object of determining the relative merits of the two methods of breeding, recommended continued.
Project No. 123 is "A Study of the Relative Merits of Tested Related and Non-Related Sires upon Production and Conformation." This project is now under way on Reymann Memorial Farms Sub-Station. Recommended continued.
- (b) Feeding Experiments
 - (1) Feeding for Milk and Fat Production It is recommended that Project No. 96 C, "Study of Sunflower Silage as a Feed for Dairy Cattle," which has been concluded, be worked up and published at once, and that Project 98 C, on soybean hay, be expanded to include time of harvesting soybean hay.

It is recommended that Project No. 134 C, "A Study of Roots for Dairy Cows," be continued.

It is recommended that experimental work be started to determine the differences, if any, in the different feeding standards now in use.
 - (2) Feeding Young Stock Project No. 97 C, is a "Study of Self-Feeder in Feeding Dairy Heifers." It is

recommended that this be completed as quickly as possible and results made available.

(3) Nutrition Investigations

It is recommended that the Project No. 139 P, "The Study of the Calcium and Phosphorus Requirements of Dairy Calves," is a very important project and that fullest facilities be made available for this work.

(c) Diseases and Parasites

It is recommended that work be started on garget control as soon as possible.

It is recommended that a compiled bulletin be published at once on the present available information on abortion and sterility.

It is recommended that work be started on control and studies of several of the more common dairy cattle infections and diseases at as early a date as possible.

(d) Dairy Manufactures

(1) Ice Cream

It is recommended that cooperative work be done with ice cream manufacture to help improve the technic and quality of ice cream.

(2) Butter

It is recommended that work be started looking towards the production of better cream in this state.

(3) Market Milk

It is recommended that Project No. 133 C, "Studies of Factors of Cream Line Control," be continued.

Project No. 124 C, "The Study of Wild Garlic and Its Elimination From Milk," is recommended for further work.

(c) Dairy Economics

(1) Management and Cost Accounting.

It is urgently recommended that work be started upon the cost of raising dairy cows in West Virginia.

It is recommended that studies be made in the several dairy sections with regard to the cost of producing in these sections.

It is recommended that there is much need of additional studies in the field that additional cooperative work be started with the Department of Farm Economics and others in rushing this work.

(2) Statistics

It is recommended that a survey be made of the dairy industry in West Virginia. This could be cooperative, but should be completed at an early date.

6.—Poultry

(a) Breeding Experiments

Some experiments should be started with the object of maintaining uniformity and increasing the vitality and egg production of poultry. A study of inherited characteristics under different environmental conditions should be made. A study should be made of incubation methods. The committee recommended that experiments be taken up with the general purpose breeds in which there is much interest all over the state.

(b) Feeding and Nutrition Experiments

Feeding experiments should be carried on as regular work of the station. Experiments should be taken up on the feeding of young stock. Nutrition investigations are much needed. Some nutrition investigations are now in progress by graduate students of the College of Agriculture which have given some important results to date.

(c) Diseases and Parasites

A study should be made of the poultry parasites prevailing in West Virginia and methods of control should be sought which are simple and effective.

It is recommended that some work be started upon the study of poultry diseases prevalent in the state.

Project No. 56 A has for its object a satisfactory method of eradicating gapes from young chickens.

(d) Poultry Management

Flocks of representative varieties should be kept.

7.—Small Animals

Project No. 140 P, "A Study of Post-Natal Development of Mammals," is now in progress. This work is being carried on with rabbits.

8.—Bees

The status of the beekeeping industry is such that the committee after careful consideration made the following recommendations:

First—That there be an extension specialist in beekeeping provided who shall be under the administration of the Extension Division of the College of Agriculture.

Second—That the extension specialist as his first project, attempt the organization of the beekeepers of the state and learn from them what they consider their most acute problems and that he, at the same time, hold demonstrations and instruct the beekeepers in the most modern methods in use in the industry.

Third—That the extension specialist be affiliated with the Experiment Station in which his first project shall be to make a survey of the present status of the industry. This shall include a study of the honey plants of the state and the areas which particularly invite the beekeeper by the opportunities they offer for successful honey production.

III. PLANT INDUSTRY

Line of Investigation Proposed	Experiments in Progress, Discussions, and Committee Recommendations
1.—Field Crops	<p>All experiments under way were approved and the desire was expressed that they be continued. Attention was particularly called to the desirability of increasing and distributing the varieties of grain, corn, and soybeans that have been found to be best adapted to West Virginia conditions.</p>
(a) Variety Testing for Yield, Quality, and Disease Resistance	<p>Variety tests are being conducted from the standpoint of yield of grain with oats, Project No. 103 C, "Oat Investigations;" with wheat, Project No. 101 H, "Wheat Investigations;" and with buckwheat, Project No. 107 C, "Buckwheat Investigations;" from the standpoint of both yield of grain and forage with corn, Project No. 102 H, "Corn Investigations;" with soybeans, Project No. 105 C, "Soybean Investigations;" from the standpoint of yield and quality of leaf with tobacco, Project No. 118 C, "Co-operative Tobacco Investigations;" and from the standpoint of resistance to scab in wheat, Co-operative Project No. 108 C, "Investigations of Oat Smut and Wheat Scab." Approved for further investigation.</p>
(b) Breeding Experiments	<p>Breeding investigations are being carried on with the following crops and for the purposes specified: Corn for high yield of both grain and forage combined with resistance to smut; wheat for high yield and quality of grain; oats for high yield of grain and resistance to smut; soy-beans for high yield of forage and retention of leaves; and tobacco for high yield and resistance to root rot. The breeding experiments outlined in certain projects have been mentioned under (a). Approved for further investigation.</p>

(c) Rate and Date of Seeding Experiments

Rate and date of seeding experiments are being carried on with wheat and buckwheat; and rate of seeding experiments with corn, soybeans, oats, and sunflowers. These lines of activity are covered by certain projects listed under (a) except the rate of seeding experiment with sunflowers which is outlined in Project No. 106 C, "Sunflower Investigations."

Approved for further investigation.

(d) Rotation Experiments

Project No. 131 C, "Crop Rotation Experiments," will be carried on at the Lakin Sub-station. The primary object of this investigation is to aid in determining the most profitable system of farming for the region in which the experiment is located.

Project No. 145 C, which has been outlined recently has for its object the determination of the effect of soybeans on the crop that follows.

Rotation experiments should be a regular part of the Experiment Station work.

(e) Maintenance of Fertility

Some experiments under this heading should be made a part of the work of the Experiment Station.

(f) Causes of Sterility

An investigation is being carried on with buckwheat to determine if possible, the cause of sterility in this crop. Project No. 107 C, "Buckwheat Investigations."

(g) Diseases and Pests

Experiments now in progress are Project No. 116, a general project covering such work in the Department of Plant Pathology, and Project No. 108 C, "Investigations of Oat Smut and Wheat Scab."

2.—Hay and Forage Crops

(a) Meadow Improvement

All experiments under way were approved and the desire expressed that they be continued.

An investigation is being carried on to determine the relative value of various grasses and legumes for hay both when

grown alone and in different mixtures. Project No. 104 C, "Hay Test of Forage Plants, Alone and in Mixtures." Approved for further investigation.

(b) Pasture Improvement

An investigation is being carried on to determine methods of building up "run down" pastures. Different fertilizer and cultural treatments together with different seeding mixtures are being tested. Project No. 112 C, "Pasture Improvement."

Approved for further investigation.

3.—Truck Crops

(a) Potato Seed Certification

Recommended that adequate steps be taken to bring about certification of Irish potato seed stock.

(b) Northern Grown vs. Native Grown Seed Stocks from High and Low Altitudes

Project No. 93 C, "Potato Investigations," sub-project 2, is a comparative study from the yield standpoint of northern grown with native stocks of the same variety from high and low altitudes.

Completed but not published.

(c) Variety Tests at Various Altitudes

Project No. 93 C, sub-project 1 is designed to test the adaptability of standard commercial varieties of potatoes to growing conditions at these altitudes.

Approved for further investigation.

(d) Rotation and Fertilizer Studies

Project No. 93 C, sub-project 5 is a study of the effect of a common "thin land" rotation with fertilizer treatments on potato yields. Approved for further investigation.

Recommended that investigations be conducted in the commercial producing areas of the state to determine the fertilizer requirements and crop rotations best suited to potato production.

(e) Date of Planting

Project 93 C, sub-project 6, is a study of the effect of time planting on yield. Completed but not published.

- (f) Sprouting Potato Seed Stock
- Project 93 C, sub-project 4, is a study of the effect of sprout removal from seed tubers on yield. Complete but not published.
- (g) Cut Seed Stock in Storage
- Project 93 C, sub-project 3 is a study of the effect of stored cut potato seed stock.
Approved for further investigation.
- (h) Fall Greening vs. Sun Sprouting
- Project 93 C, sub-project 8, is a comparative study of the effects of sun sprouting in the spring with fall greening on storage qualities, vigor and yield. Approved for further investigation.
- (i) Tuber Shape Studies
- Project 93 C, sub-project 7, is a study of the effect of tuber shape on yield. Approved for further investigation.
- (j) Variety Tests
- Project No. 147 C, "Tomato Investigations," sub-project 1, is a test to determine the best varieties of tomatoes for canning in the eastern canning sections. Approved for further investigations.
- Recommended that investigations be made in culture, fertilization, and crop rotation to determine how the profitability of the industry may be increased. Furthermore, investigations should be started to determine if sweet corn can be profitably grown for canning purposes to provide a cash crop and lengthen the canning season for the canners.
- (k) Diseases and Pests
- Project No. 36 H, deals with the tomato disease problem, with special reference to the late blight and its possible relation to late blight of potato.
- Project 33 H, which includes a study of dusting vs. spraying for control of truck crop diseases is also active.
- Project No. 7 A is a study of the cucumber mildew.

The wilt diseases of melons and cabbage are receiving some attention and other truck crop diseases will be studied as occasion may demand.

4.—Fruit Crops

(a) Apple

(1) Cultural Experiments and Fruiting Habits

Project No. 20 H is entitled "Fertilizers for Apples and Peaches." The phase of this project on apples is located at Sleepy Creek in Morgan County and St. Marys in Pleasants County. Project No. 114 C is the cultural experiment at the University. Other preliminary tests are in progress in Berkeley, Jefferson, Mason, and Pleasants counties to determine the influence of different combinations of culture, fertilization, and pruning upon fruit bud formation and yield. A report on apple fertilization has been published as Bulletin 203. Approved for further investigation.

It is recommended that work be started to determine the cover crops best suited to orchard conditions and also the time and rate of seeding.

(2) Pruning, Physiology, and Growth Responses

Project No. 11 A, "The Physiological Effects of Pruning Apple Trees," includes studies on the time of storage of plant food; the effect of varying degrees of severity and time of pruning upon growth, bloom, and yield; the physiology of pruning; and root studies. A report on this project is now being prepared and will be published in the near future. Approved for further investigation.

Recommended that the pruning work be "extended to include trees that have been neglected for a number of years and are just coming into bearing. Also trees that have been in heavy bearing for a number of years, to determine its effect on fruit setting, yield, and cost of production. It is recommended that the necessary steps be taken to develop

apple root stocks best suited to West Virginia conditions.

(3) Pollination, Growth, and Fruit Setting

Project No. 5 A is entitled "Pollination of the Apple." Preliminary studies have extended this project to include the relation of growth, pruning, and fertilizers upon the set of fruit and hence yield.

Approved for further investigation. On account of the light setting of Black Twig and others, the committee recommended that "steps be taken to determine the advisability and methods of top working unprofitable varieties such as Black Twig."

(4) Diseases and Pests

Projects now in progress are No. 33 H, "Comparison of Dusting and Spraying for Orchard Insects and Disease Control;" No. 38 S, "Apple Leaf Diseases." No. 39 S, "Collar Rot." No. 15 H, "Control of Insects by Impregnations of Sap and Plants with Poison." The apple is the most important tree fruit crop in the state and intense work should be continued to safeguard the industry. Recommended that "a survey be made of spraying systems and machinery, especially the hydrant system, to determine the one best suited to West Virginia conditions."

(5) Variety Tests

Project 86 H, "Variety Tests with Apples" was approved for further study. A bulletin on varieties of tree fruits for West Virginia is in process of compilation.

(6) Packing and Marketing

It is recommended that the work begun in comparative returns from different methods of packing apples at the Community Packing House be continued and that an effort be made to secure comparative net returns to the growers from apples packed in barrels, boxes, and other packages.

(7) Apple By-Products

It is recommended that all the information available on apple by-products

be compiled and made available to those interested in fruit growing.

(b) Peach

(1) Fertilization, Pruning,
and Culture

In Project No. 20 H, "Fertilizers for Apples and Peaches," the phase of this work with the peach has been completed and published as Bulletin 183. A report on Project No. 90 C, "Physiological Effect of Pruning," is now being prepared and will be published in the near future. Approved for further investigation.

Recommended by the committee that "investigations be started to determine the proper methods of handling peach orchards to maintain the soil fertility and its relation to yield."

(2) Growth Studies and Dormancy

Project 114 C, sub-project 4, is entitled "Growth Studies of the Peach." Project No. 114 C, sub-project 1, is a study of dormancy in the peach buds. A preliminary report on this project has been prepared and will be published this year. Approved for further investigations.

(3) Variety Tests

Project 86 H is entitled "Variety Tests of Fruit Trees Including the Peach." A bulletin on varieties of tree fruits for West Virginia is in process of compilation.

Investigations are under way to determine the cause of light setting in J. H. Hale and other varieties. A preliminary report on this problem is being compiled.

4.—Diseases and Pests

Projects now active are No. 33 H, "Comparisons of Dusting and Spraying for Orchard Insect Control and Diseases of the Apple," No. 15 H, "Control of Apple and Peach Tree Borers," and No. 71 A, "Control of Insects by Means of Impregnation of Sap and Plants with Poisonous Substances."

(c) Small Fruits

(1) Bush Fruits

Project 87 H includes (a) "Variety Tests of Brush Fruits;" (b) "Pruning Experiments with the Bush Fruits;" and (c) "Fertilizer Experiments with the Bush Fruits."

(2) Strawberry

Project 88 H includes (a) "Variety Tests, Cultural Experiments, and Field Plot Technic with the Strawberry," and (b) "Fertilizer Experiments with the Strawberry."

In Project 114 C a study is being made of the rooting habits of the strawberry. Preliminary studies are under way in the breeding of the thornless blackberry.

(3) Grape

Project 89 H includes (a) "Fertilizer Experiments;" (b) "Variety Testing," and (c) "Training Experiments."

Results of the fertilizer experiments are being prepared for publication.

(4) Diseases

It is recommended that attention be given to diseases and insects as the emergency demands. While no active projects are under way advice is given on control measures as requested.

(5) Small Fruits Survey

It is recommended that the small fruit field be carefully surveyed to determine the problems which are in most urgent need of attention and that work on any such problem be undertaken at the earliest possible time.

• (d) Miscellaneous Tree Fruits

Project 86 H includes variety tests of the different fruits, and 90 C is a study of the fundamental principles of pruning with the cherry, plum, quince, and pear.

5.—Forestry

(a) The Farm Wood Lot

No work is being done in forestry. It is urged that some work be started in forestry and conservation of our natural resources.

(b) Forest Nursery

The Experiment Station has published Bulletin No. 178 "West Virginia Trees," by A. B. Brooks, for which there is a large demand, indicating the very wide state interest in the subject.

It is recommended that a forest nursery be started.

(c) Forest Management

Experiments in forest management are recommended.

(d) Disease Control

It is recommended that this subject be investigated but no specific disease or trees were indicated in the recommendation.

3.—Soils

(a) Fertility Experiments

DeKalb soil has been filled in large cylinders sunk in the ground. Various applications of lime have been made and the effect of varying the lime requirement on the growth of crops is being studied.

(b) Surveys

Bulletin 184, "Chemical Analyses and Fertility of West Virginia Soils," was published July, 1924.

A survey of the lime requirement of the soils of the state is being compiled from data obtained from analyses made on the lime trains. Data secured at the station will be included.

(c) Physical Properties

(d) Biology

Project No. 132 C is in progress. This includes testing the inoculating power of commercial bacterial cultures and investigating optimum conditions for growth. Project No. 143 C is in progress. This is an investigation of nitrate formation in soils growing wheat after soybeans. Some preliminary investigations are being started to determine the nature of the benefit non-legumes derive from associated growth with legumes.

IV. HOME ECONOMICS

Line of Investigation Proposed	Experiments in Progress, Discussions, and Committee Recommendations
(a) Foods and Nutrition	Work is being done upon the standardization of Cherry Preserves under Project No. 136 P, entitled "Study of Methods Looking Toward the Economic Utilization of Surplus Food Products with Special Reference to the Problems of the Home." It was recommended that the work of utilization of surplus fruits on the farm be expanded.
(b) Textiles and Clothing	It was recommended that a study of clothing expenditures be made.
(c) The House	It was recommended that a cooperative project be started with the Farm Engineering Department on the arrangement of the farm plant with special reference to sanitary conditions and their relation to the farm home and to its beautification.
(d) Home Management	
(1) Food Habits	It was recommended that a study be made of the food habits in West Virginia.
(2) Standards of Living	It was recommended that a study in cooperation with the department of Farm Economics on the Standards of living to determine the standards of expenditures for the farm home.
(e) Applied Arts	It was recommended that a study be made of home furnishings in their relation to family life.

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